CLAIMS

What is claimed is:

1. A variable capacity rotary compressor, comprising:

first and second compression chambers having different capacities;

a rotating shaft passing through the first and second compression chambers;

first and second eccentric cams eccentrically mounted to the rotating shaft to be placed in the first and second compression chambers, respectively;

first and second eccentric bushes fitted over the first and second eccentric cams, respectively, to cause an eccentric line of the first eccentric bush to cross an eccentric line of the second eccentric bush; and

a locking pin to change a position of the first or second eccentric bush to a maximum eccentric position, according to a rotating direction of the rotating shaft.

2. The rotary compressor according to claim 1, wherein an angle between a maximum eccentric part of the first eccentric bush and a maximum eccentric part of the second eccentric bush is less than 180° in a rotating direction of the first or second eccentric bush which executes a compression operation.

3. The rotary compressor according to claim 1, wherein the locking pin is positioned between the first and second eccentric cams, which are eccentric in a same direction, and the first and second eccentric bushes are integrated with each other by a connecting part, which connects the first and second eccentric bushes to each other, with a slot of a predetermined length being formed around the connecting part, and the locking pin coming into contact with a first end or a second end of the slot while the rotating shaft is rotated as the locking pin is inserted into the slot, to cause the first and second eccentric bushes to be rotated as the position of either of the first and second eccentric bushes is changed to the maximum eccentric position with respect to the rotating shaft.

4. The rotary compressor according to claim 3, wherein the locking pin comprises:

a threaded shank; and

a head, having a larger diameter than the shank, formed at an end of the shank wherein the head being projected from the rotating shaft in a radial direction when the shank of the locking pin is inserted into a hole which is formed on the rotating shaft at a position which is spaced apart from a maximum eccentric part of each of the first and second eccentric cams, at about 90°.

5. The rotary compressor according to claim 4, wherein the slot has an arc shape with an angle of less than 180° formed between a line extending from the first end of the slot to a center of the rotating shaft and a line extending from the second end of the slot to the center of the rotating shaft.

6. The rotary compressor according to claim 5, wherein the first end of the slot is positioned to follow the maximum eccentric part of the first eccentric bush at about 90° when the rotating shaft is rotated in a first direction, and the second end of the slot is positioned to lead the maximum eccentric part of the second eccentric bush at about 90° when the rotating shaft is rotated in a second direction, to cause the position of the first or second eccentric bush to be changed to the maximum eccentric position, when the rotating shaft is rotated in the first or second direction with the locking pin coming into contact with the first end or the second end of the slot and the eccentric lines of the first and second eccentric bushes crossing each other.

7. The rotary compressor according to claim 6, wherein, when the rotating shaft is rotated in the first direction to cause the locking pin to be in contact with the first end of the slot, a position of the maximum eccentric part of the first eccentric bush is changed to the maximum eccentric position where the maximum eccentric part of the first eccentric bush corresponds to the maximum eccentric part of the first eccentric cam, to cause a compression operation to be executed in the first compression chamber, and a position of the maximum eccentric part of the second eccentric bush is changed to a minimum eccentric position where the maximum eccentric part of the second eccentric bush is adjacent to a minimum eccentric part of the second eccentric cam, thus preventing a compression operation from being executed in the second compression chamber.

8. The rotary compressor according to claim 7, wherein, when the maximum eccentric part of the first eccentric bush passes an outlet port of the first compression chamber, a rotating resistance acts on the second eccentric bush in a direction opposite to a rotating direction of the rotating shaft due to a difference in pressure between an inside portion of the second compression chamber, where the eccentric line of the second eccentric bush extends about 180° or less relative to the eccentric line of the first eccentric bush, and an outside portion of the second compression chamber opposite to the inside portion, thus preventing the first eccentric bush from being rotated at a speed faster than the rotating shaft, therefore preventing the first eccentric bush from slipping.

9. The rotary compressor according to claim 6, wherein, when the rotating shaft is rotated in the second direction to cause the locking pin to be in contact with the second end of the slot, a position of the maximum eccentric part of the second eccentric bush is changed to the maximum eccentric position where the maximum eccentric part of the second eccentric bush corresponds to a maximum eccentric part of the second eccentric cam, to cause a compression operation to be executed in the second compression chamber, and a position of the maximum eccentric part of the first eccentric bush is changed to a minimum eccentric position where the maximum eccentric part of the first eccentric bush is adjacent to a minimum eccentric part of the first eccentric cam, thus preventing a compression operation from being executed in the first compression chamber.

10. The rotary compressor according to claim 9, wherein, when the maximum eccentric part of the second eccentric bush passes an outlet port of the second compression chamber, a rotating resistance acts on the first eccentric bush in a direction opposite to a rotating direction of the rotating shaft due to a difference in pressure between an inside portion of the first compression chamber, where the eccentric line of the first eccentric bush extends about 180° or less relative to the eccentric line of the second eccentric bush, and an outside portion of the first compression chamber opposite to the inside portion, thus preventing the second eccentric bush from being rotated at a speed faster than the rotating shaft, therefore preventing the second eccentric bush from slipping.

11. A variable capacity rotary compressor, comprising:

first and second compression chambers having different capacities, in which compression operations are carried out;

a rotating shaft, passing through the first and second compression chambers, to rotate in first and second directions;

first and second eccentric cams mounted to the rotating shaft in the first and second compression chambers, respectively;

first and second eccentric bushes, each including a maximum eccentric part, fitted over the first and second eccentric cams, respectively, to be eccentric in opposite directions with respect to the rotating shaft, with an angle between the maximum eccentric parts being less than 180°;

first and second rollers fitted over the first and second eccentric bushes to be rotated along inner surfaces of the first and second compression chambers, to thereby compress a gas flowing into the first and second compression chambers, respectively; and

a locking pin to change a position of the first or second eccentric bush to a maximum eccentric position, according to one of the rotating directions of the rotating shaft.

12. The rotary compressor according to claim 11, wherein the locking pin is positioned between the first and second eccentric cams.

13. The rotary compressor according to claim 12, wherein the first and second eccentric bushes are integrated with each other by a connecting part which connects the first and second eccentric bushes to each other.

14. The rotary compressor according to claim 13, wherein the connecting part comprises a slot, including first and seconds ends, having a predetermined length, formed around the connecting part.

15. The rotary compressor according to claim 14, wherein the locking pin contacts one of the first and the second end of the slot while the rotating shaft is rotated, and thereby the first and second eccentric bushes are rotated as the position of either of the first and second eccentric bushes is changed to the maximum eccentric position with respect to the rotating shaft.

16. The rotary compressor according to claim 15, wherein the locking pin comprises:

a threaded shank; and

a head, having a larger diameter than the shank and formed at an end of the shank, to be projected from the rotating shaft in a radial direction.

17. The rotary compressor according to claim 16, wherein the shank of the locking pin is inserted into a hole which is formed on the rotating shaft at a position which is substantially 90° from the maximum eccentric part of each of the first and second eccentric cams.

18. The rotary compressor according to claim 17, wherein the slot extends less than 180° around the rotating shaft.

19. The rotary compressor according to claim 18, wherein the first end is positioned to follow the maximum eccentric part of the first eccentric bush at substantially 90° when the rotating shaft is rotated in a first direction.

20. The rotary compressor according to claim 19, wherein the second end of the slot is positioned to lead the maximum eccentric part of the second eccentric bush at substantially 90° when the rotating shaft is rotated in a second direction.

21. The rotary compressor according to claim 20, wherein, when the rotating shaft is rotated in the first direction, a position of the maximum eccentric part of the first eccentric bush is changed to the maximum eccentric position where the maximum eccentric part of the first eccentric bush corresponds to the maximum eccentric part of the first eccentric cam.

22. The rotary compressor according to claim 21, wherein when the rotating shaft is rotated in the first direction, a position of the maximum eccentric part of the second eccentric bush is changed to a minimum eccentric position where the maximum eccentric part of the second eccentric bush is adjacent to a minimum eccentric part of the second eccentric cam.

23. The rotary compressor according to claim 22, further comprising an outlet port of the first compression chamber, wherein, when the maximum eccentric part of the first eccentric bush passes the outlet port, a rotating resistance acts on the second eccentric bush in a direction opposite to a rotating direction of the rotating shaft due to a difference in pressure between an inside portion and an outside portion of the second compression chamber.

24. The rotary compressor according to claim 20, wherein, when the rotating shaft is rotated in the second direction, a position of the maximum eccentric part of the second eccentric bush is changed to the maximum eccentric position where the maximum eccentric part of the second eccentric bush corresponds to the maximum eccentric part of the second eccentric cam.

25. The rotary compressor according to claim 23, wherein when the rotating shaft is rotated in the second direction, a position of the maximum eccentric part of the first eccentric bush is changed to a minimum eccentric position where the maximum eccentric part of the first eccentric bush is adjacent to a minimum eccentric part of the first eccentric cam.

26. The rotary compressor according to claim 24, further comprising an outlet port of the second compression chamber, wherein, when the maximum eccentric part of the second eccentric bush passes the outlet port, a rotating resistance acts on the first eccentric bush in a direction opposite to a rotating direction of the rotating shaft due to a difference in pressure between an inside portion and an outside portion of the first compression chamber.